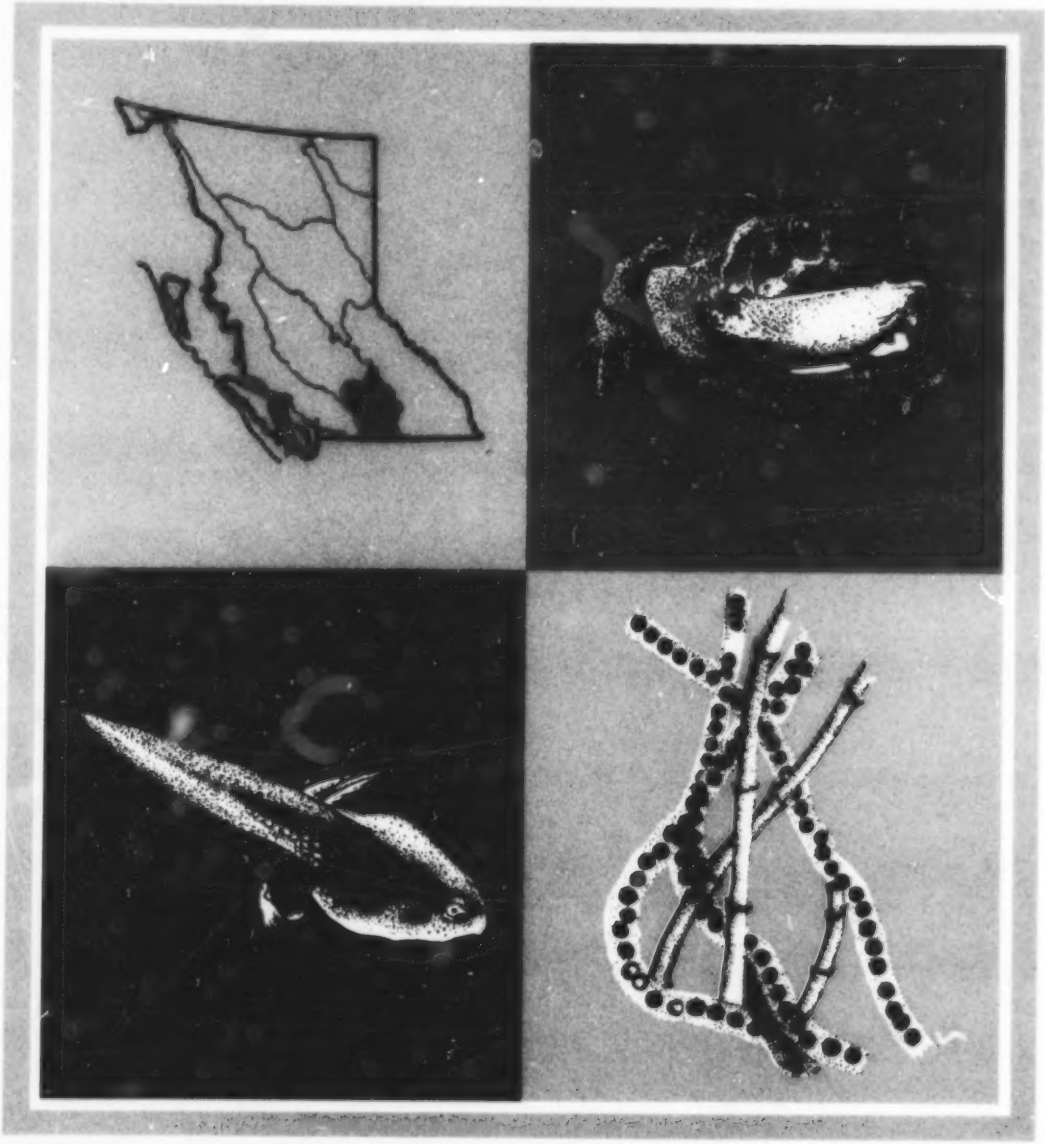
WILDLIFE HABITAT Handbook

for the Southern Interior Ecoprovince



Vol. 8 Species — Habitat Relationship Models for Amphibians

BC

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WILDLIFE HABITAT HANDBOOKS FOR THE SOUTHERN INTERIOR ECOPROVINCE

VOLUME 8: SPECIES - HABITAT RELATIONSHIP MODELS FOR AMPHIBIANS

Stan A. Orchard
and
Andrew P. Harcombe

A cooperative effort of the
Ministry of Environment (Wildlife Branch),
the Ministry of Forests (Research Branch),
and Wildlife Habitat Canada

Andrew P. Harcombe
Technical Editor
Wildlife Branch
Ministry of Environment
Victoria, B.C.

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Research Branch
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V8W 3C7

Public Affairs and Communications Branch
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780 Blanshard Street
Victoria, B.C.
V8V 1X5

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PREFACE

This publication is part of the series "Wildlife Habitat Handbooks of the Southern Interior Ecoprovince". The purpose of this series is to provide forest, wildlife, and range managers with the knowledge and tools to assess impacts of various land management practices on wildlife and its habitat. Basic to this assessment process is an understanding of wildlife's relationship to habitat.

The information in this series applies specifically to the Southern Interior Ecoprovince and similar ecosystems in the southern area of British Columbia. The principles and processes described, however, apply generally to all managed forests and rangelands, when the welfare of wildlife is affected by land management decisions.

The series is a comprehensive package composed of eleven separate volumes. Although each part will be an independent treatment of a specific subject, when combined in sequence, the individual parts will be as chapters in a book. The final sequence is shown on the inside back cover of this publication, but individual chapters will be printed as they become available. Though this ensures that the information will be used as quickly as possible, the order of production will not be the same as the final organized order.

"Wildlife Habitat Handbooks of the Southern Interior Ecoprovince" is a cooperative effort of the British Columbia Ministries of Environment (Wildlife Branch, Fisheries Branch), the Ministry of Forests (Research Branch), the Ministry of Municipal Affairs, Recreation and Culture (Royal British Columbia Museum), the University of British Columbia and Simon Fraser University, and the Canadian Wildlife Service.

Andrew P. Harcombe
Technical Editor
Victoria, B.C.

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The authors would like to thank Lynne Foxall, Dauna Walker, and Darla Cooper for their patience in typing this document and in enduring the changes and editing that invariably follows. Intensive editing was done by Tracy Hooper and Elizabeth Stanlake, while Linda Stordeur prepared the final format prior to publication. Cover design was by Nicholas Newbeck. Graphics were prepared by Gail Harcombe, Glenn Kubian, and Rick Thomas.

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1 Introduction

1. INTRODUCTION

1.1 Background, Philosophy and Limitations

The major wildlife goal in British Columbia is to maintain the diversity of species. This is a difficult goal to achieve with the large number of species, habitats, and land use activities. For most species, the desired information for management is scanty, scattered, and descriptive. Thus it is difficult to predict outcomes of land use practices on habitat and on wildlife, especially with few staff, low budgets, and high rates of habitat change.

The wildlife habitat handbook project was initiated to develop planning tools to aid wildlife habitat managers in predicting consequences of management activities on habitat and therefore on wildlife. Two major premises of this handbook are:

1) most wildlife habitat will be managed indirectly by influencing other resource managers to modify their activities for the benefit of wildlife;
2) all wildlife species and their habitat requirements must be considered in the process.

This handbook system organizes biological data for various ecosystems or habitats, in a framework that assists resource managers in predicting consequences and in developing alternatives. It is based on similar approaches to species diversity management in the United States. Our approach was to begin with a pilot study in the Southern Interior Ecoprovince (see Figures 1 and 2). This set of information pertains only to the Southern Interior Ecoprovince, and may not be valid in other areas of the province.

The following report assimilates knowledge on the relationships between amphibians and their habitats, based on a blend of literature and professional expertise. Several assumptions are made. The first is that habitat requirements of wildlife can be related to successional stages for most habitats, and the second is that the resulting values (i.e. relating animal use to habitat) are a good approximation of those habitat requirements. The third assumption is that of the possible life requisites, the three most important are feeding, reproduction, and special needs. The fourth assumption is that habitats of comparable value to a species seasonal needs can be substituted for each other. Very little experimental data or documentation were available on which to base the model ratings. Whenever information in the literature was not definitive, we used judgement and inferences. The guiding philosophy for using these data was to be flexible and to do the best with present knowledge, while always looking at ways of improving as more knowledge is gained.

Extensive *habitat* management by using such activities as logging and grazing is relatively new, and wildlife inputs to the planning process must be initiated for all wildlife species. A knowledge of wildlife-habitat relationships will aid in the development of coordinating guidelines to integrate these requirements with other land use activities. This system will not resolve all problems; rather, it will provide a systematic organization of available biological information on species and their habitat needs in a useful way. Professional input by biologists will still be needed to ensure correct interpretations and to validate the applicability of models, which represent "average" conditions and anticipated responses. Other resource uses will continue regardless, and our best knowledge, though often inadequate, must be utilized now; we cannot afford to wait for better data quantity or quality.

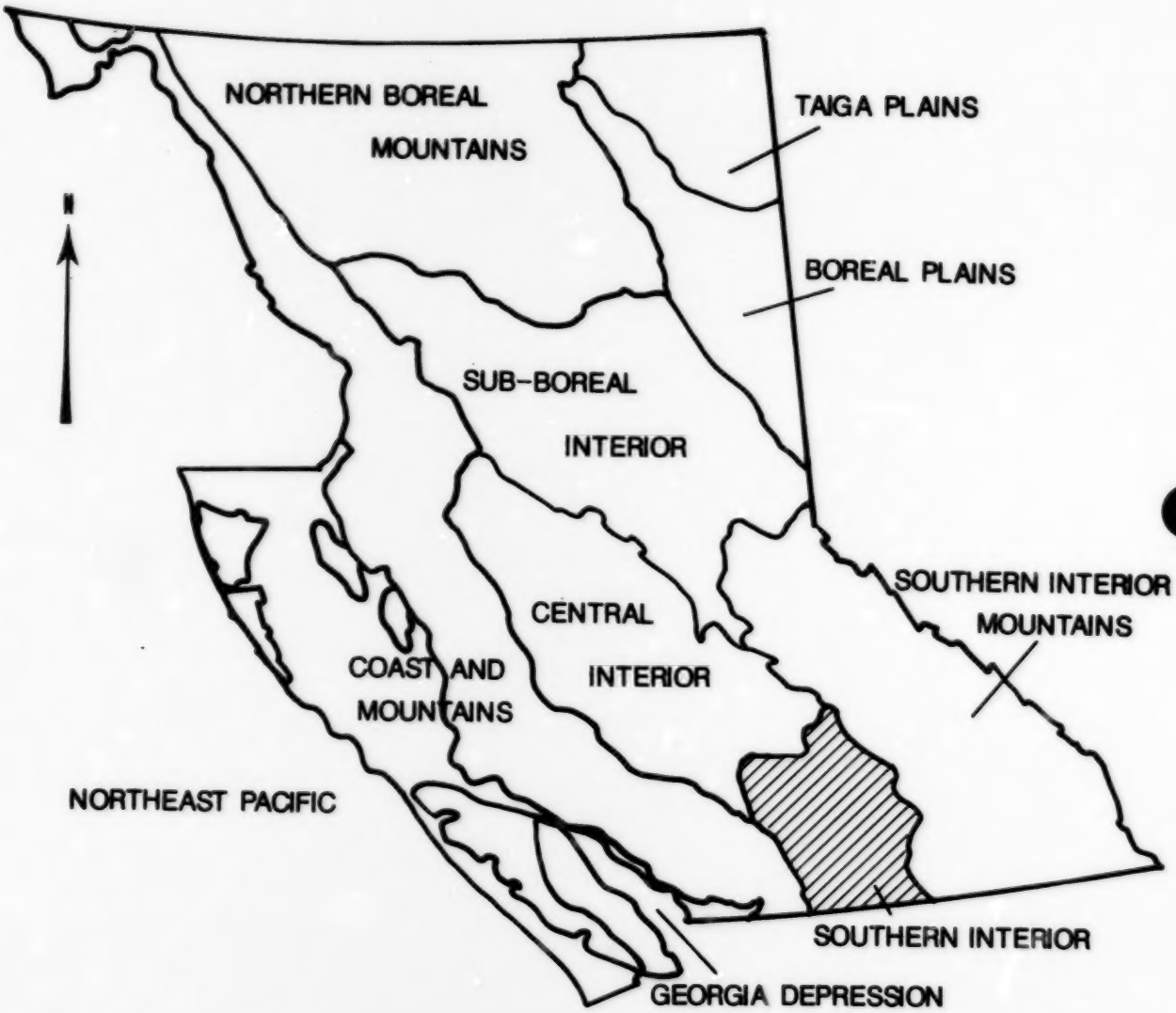

Figure 1. Location of the Southern Interior Ecoprovince

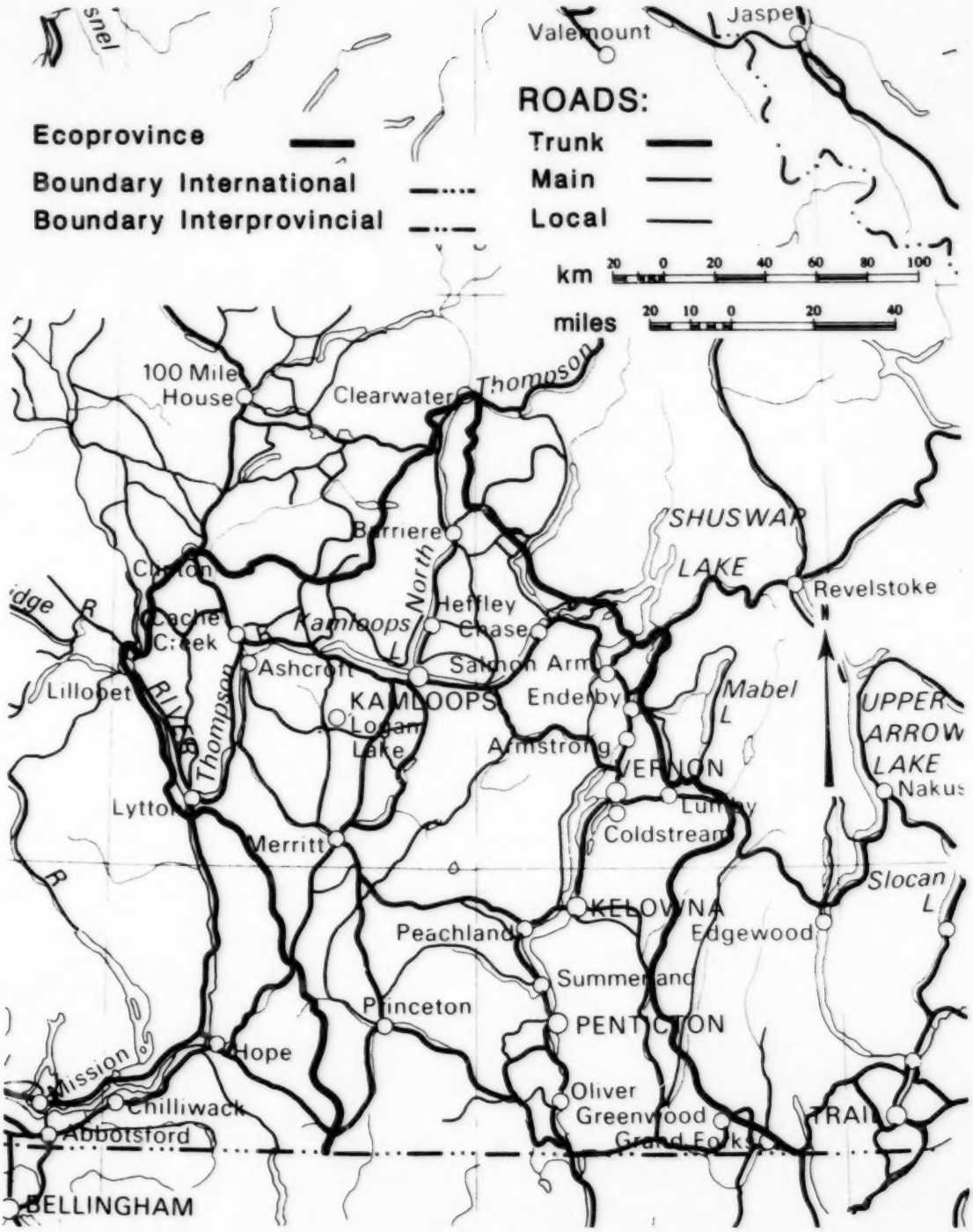

Figure 2. The Southern Interior Ecoprovince

2

Species-Habitat Relationship Models

2. SPECIES—HABITAT RELATIONSHIP MODELS

2.1 Explanation of the Species-Habitat Relationship Data Base

Species nomenclature follows that described in Volume 4. Accepted common names have been modified to fit Nagorsen (in draft).

For each species (see Chapter 4 for complete listing), a standardized set of information is provided in two types of tables. The first table consists of a listing of all habitats or habitat complexes used by that species; the seasons it uses each habitat; and the expected relative abundance of the species in that habitat. For the habitat classification, we followed a province-wide scheme (Harcombe and Lea (in prep.)); detailed descriptions of habitats used in the models may be found in Harcombe *et al.* (1988).

For seasons, we use summer (S) and winter (W). Summer, as used here, includes the traditional seasons of spring, summer, and fall, unless spring and/or fall are explicitly named separately. For relative abundance, we followed a five-part scale of absent, rare, scarce, common, and abundant. For amphibians, we did not assign numbers to these categories of abundance; the categories are used as abundance relative to all other amphibian species. Hence, a species with a very large home range may only achieve a rare or scarce category, even if that species is at maximum densities. Abundance is strictly a qualitative rating.

The second set of tables or matrices displays the species-habitat relationship values for:

1) all habitats in which the abundance was rated as common or abundant for a particular season of use; or
2) all habitats in which the highest abundance category was only scarce.

This principle was followed since we expect that most species will only be managed in habitats where they are fairly common or if they are very scarce.

There are three formats to the species-habitat relationship matrices, depending on the habitat: 1) upland and wetland habitats; 2) aquatic and deepwater habitats; and 3) man-influenced habitats. All matrices identify the habitat and applicable season of use for the model. For all native upland or wetland (palustrine) habitats, the tables display a full set of successional stages (see Figure 3). These successional stages are designed primarily for forested habitats, but are also used when only herbaceous or shrub- dominated stages exist for the habitat. For example, suitability values for a shrub wetland complex will only be entered under the first two successional stages. The six successional stages are:

1) grass/forb: herbaceous-dominated; usually the first successional stage for most upland habitats; herbaceous cover exceeds 5%; shrub or tree canopy is less than 5%.
2) shrub/seedling: dominated by woody shrubs or seedling trees (less than 3 cm dbh) or both with cover exceeding 5%; tree canopy is less than 5%; includes shrubs in both the tall shrub layer (B1 - between 2 m and 10 m tall) and the low shrub layer (B2 - below 2 m high). Species of low woody form or of doubtful lifeform are assigned to the herbaceous layer these are listed in Walmsley *et al.* (Table 4.2, p. 141, 1980).
3) pole sapling: dominated by trees; tree canopy exceeds 5% closure; trees are generally less than 25 cm dbh; natural thinning is not underway; canopy is more or less even height; stands are generally less than 40 years old.
4) young: dominated by trees; tree canopy exceeds 5% cover; trees are generally 25-60 cm dbh; natural thinning beginning; stands are usually less than 80 years old, and not considered mature enough for harvesting.
5) mature: dominated by trees; tree canopy exceeds 5% cover; trees usually greater than 60 cm dbh; natural thinning underway; stands are usually 80-150 years old; understory regeneration of climax species well established.
6) old growth: dominated by trees; tree canopy exceeds 5% closure; dominant trees have greater than 60 cm dbh; all age and height of tree classes are represented; dead and down trees are present; stands usually older than 150 years.

Each of the latter five successional stages have been subdivided into three canopy closure classes, as closure strongly influences understory vegetation. The canopy closure classes are:

1) sparse (S): 0-25% canopy closure; this includes B.C. Forest Service inventory cover classes 0, 1, and 2.
2) moderate (M): 26-65% canopy closure; this includes B.C. Forest Service inventory cover classes 3, 4, 5 and 6.
3) dense (D): 66-100% canopy closure; this includes B.C. Forest Service inventory cover classes 7, 8 and 9.

Three additional columns are added after the successional stages to provide for ratings of specific habitat elements. These habitat elements are vegetative components that are not specific to any particular successional stage (and thus cannot be readily predicted from cover maps yet are important to wildlife). They are needed in a particular successional stage to attain the indicated value. The habitat elements are:

1) down materials (DM): trunks and limbs of trees in various stages of decomposition found on the

forest floor of the habitat (dead and down woody material)

2) snags (SN): standing dead or dying trees from which the leaves and most of the limbs have fallen; broken off trees more than about 3 m tall are included.
3) deciduous (DEC): pertaining to a deciduous domination of that particular successional stage; used when coniferous domination is the normal condition for the habitat succession, though the presence of deciduous trees may greatly improve the suitability.

For the aquatic habitats, a second matrix format is used (see Figure 4). Values for the shallow open water habitat class are listed under "Pond". For other freshwater aquatic habitat classes, subdivisions are based on aquatic zones and substrate types. The aquatic zones are:

1) shore: substrate is continuously exposed, with less than 2% vegetation cover.
2) littoral: extends from shoreward boundary to a depth of 2 m below low water or to the maximum extent of plant rooting, whichever is greater; used in both lake and stream habitat classes.
3) deepwater or limnetic (DEEPW): open water, not closely associated with a bottom; restricted to the lake habitat class.

Substrate types are defined as:

1) rock (R): substrate consists of greater than 75% arealcover of stones (greater than 25 cm in size), or bedrock and vegetative cover is less than 26%.
2) unconsolidated (U): substrate with at least 25% areal cover of particles smaller than stones [1]; vegetative cover less than 26%.
3) aquatic bed (A): substrate with at least 26% vegetative cover, being dominated by plants that grow principally on or below the surface of the water for most of the growing season.

For man-influenced habitats and special habitats, a third matrix format is used (see Figure 5), in order to save space for "single entry" habitats. Only orchard habitat class is subdivided into young and mature (fruit-bearing), with moderate or dense canopy closure. The other habitat classes are cultivated field (C.FLD), pasture (PAST.), urban, barren (BARR.), man-made elements (M.M.ELE.) such as buildings and bridges, and special habitats (cliffs and caves).

The estimated value of a component of a habitat for a species seasonal life requisites is called the suitability index. This is a relative value, with four ratings of high (h), moderate (m), low (l), or nil:

1) high: provides for life requisites (reproduction, feeding, or designated special needs [2]) and supports a relatively high population density (as implied by probability of occurrence of greater than 50%); can support positive recruitment (an increasing population or a stable population with dispersal); unit use greater than 50% of the time; this optimal value suggests that the minimum population numbers will be met; that is, 1 hectare of the habitat rated with H will provide 1 hectare of the required area.
2) moderate: provides for life requisites (reproduction, feeding, or designated special needs); supports medium population density (as implied by probably of occurrence of 26-50%); can support a stable population, with no dispersal excess; unit use 26-50% of the time; estimated to be one-half the value of high, and thus it will take 2 hectares of habitat to satisfy 1 hectare requirement for minimum population.
3) low: provides for life requisites (reproduction, feeding, or designated special needs); supports relatively low population density (as implied by a probability of occurrence less than 25%); supports viable population only with immigration or inhabited primarily by colonizing individuals; unit use less than 25% of the time; estimated to be one-fifth the value of high, and thus it will take 5 hectares of habitat to satisfy 1 hectare requirement for minimum population.
4) nil: designates that the habitat component is judged to be of little or no value to the species because it does not meet a species life requisites. The species is not expected to occur in the habitat.

When significant differences in habitat requirements exist for life stages (larval vs. adult), the models and habitats used may be subdivided by life forms.

All habitats are rated comparatively to each other to the degree possible. Hence, highs are equal with respect to meeting habitat requirements of a species, and similarly rated successional stages/canopy closure habitat components can be substituted for each other both within and among habitat classes. This means that in a system of planned manipulation of wildlife habitats, alternative amounts and kinds of habitat can be used to minimize impact on the habitat for species of special management concern; the status quo is not the only or possibly the best alternative.

[1] includes cobbles (7.5-25 cm); gravel (2 mm-7.5 cm); sands 0.05-2.0 mm; silts (0.002-0.05 mm); and clays (less than 0.002 mm) (Walmsley *et al.* 1980).

[2] possible designated needs include climatic extreme avoidance, antipredator cover, and migratory/ movement cover.

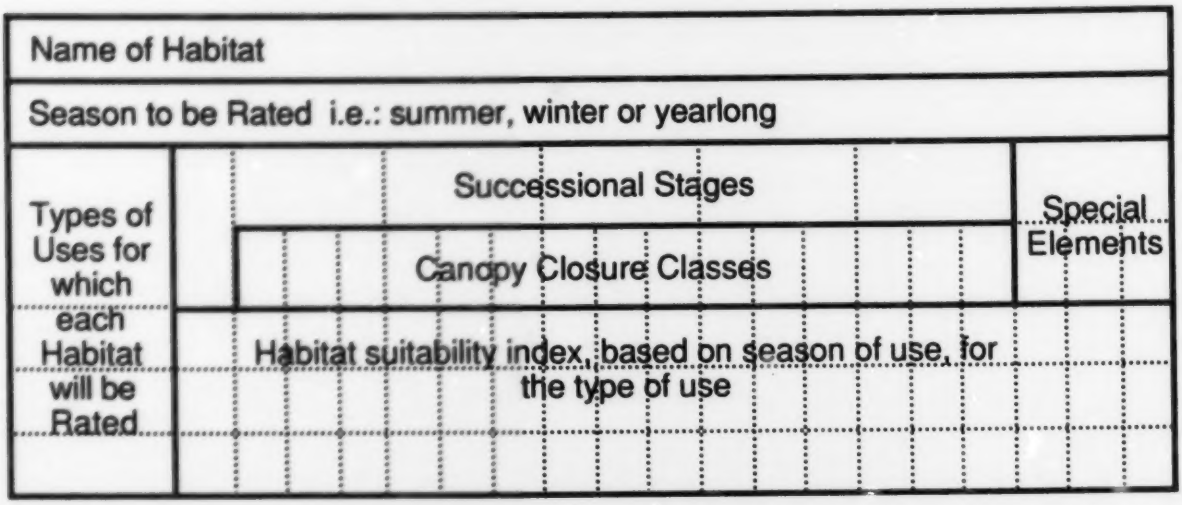
Name of Habitat
Season to be Rated i.e.: summer, winter or yearlong
Types of Uses for which each Habitat will be Rated
Successional Stages
Canopy Closure Classes
Special Elements
Habitat suitability index, based on season of use, for the type of use

Figure 3. Example of a matrix for upland or wetland habitats.

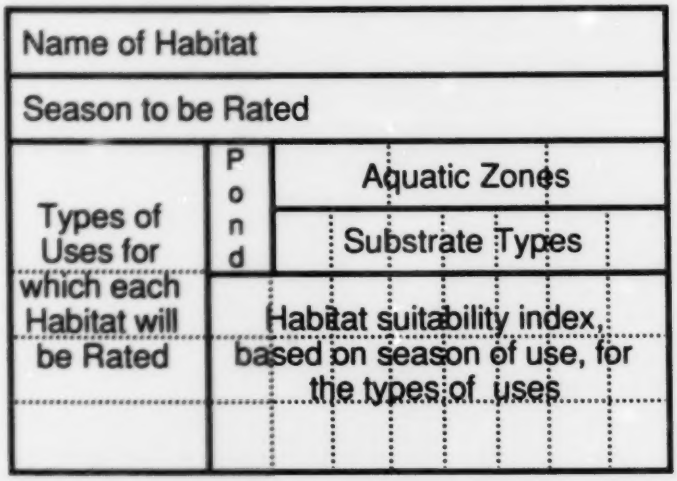
Name of Habitat
Season to be Rated
Types of Uses for which each Habitat will be Rated
Pond
Aquatic Zones
Substrate Types
Habitat suitability index, based on season of use, for the types of uses

Figure 4. Example of a matrix for aquatic habitats.

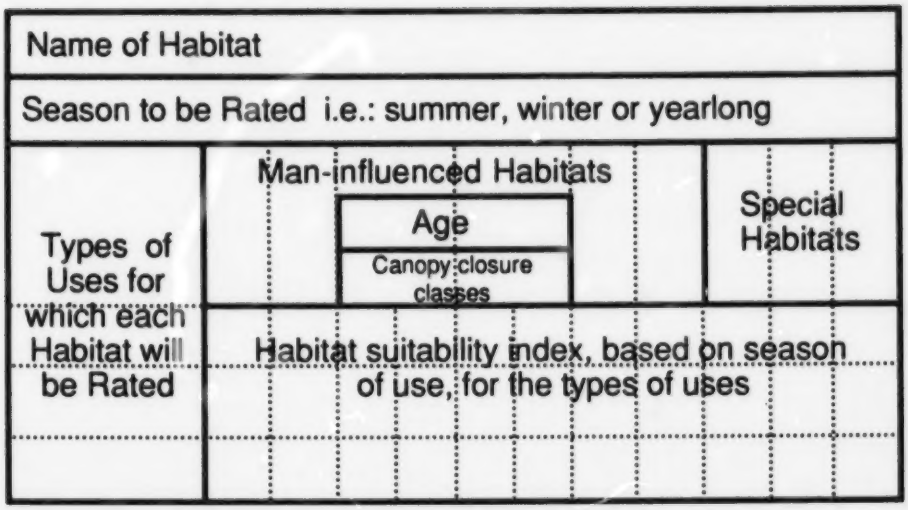
Name of Habitat
Season to be Rated i.e.: summer, winter or yearlong
Types of Uses for which each Habitat will be Rated
Man-influenced Habitats
Age
Canopy closure classes
Special Habitats
Habitat suitability index, based on season of use, for the types of uses

Figure 5. Example of a matrix for man-influenced habitats.

2.2 Species - Habitat Relationship Models

SOUTHERN INTERIOR ECOPROVINCE

Long-toed Salamander

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
ponderosa pine	yearlong	scarce
Douglas-fir - ponderosa pine	yearlong	scarce
Douglas-fir - lodgepole pine	yearlong	scarce
Engelmann spruce - subalpine fir dry forested	yearlong	scarce
spruce riparian	yearlong	scarce
Engelmann spruce - subalpine fir dry parkland	yearlong	scarce
trembling aspen copse	yearlong	scarce
black cottonwood riparian	yearlong	scarce
big sage shrub/grassland	yearlong	scarce
talus/rock	yearlong	scarce
bunchgrass grassland	yearlong	scarce
dry alpine	yearlong	scarce
alpine meadow/subalpine meadow	yearlong	scarce
shallow open water	spring	common
lake	spring	common
slow perennial stream	spring	common

Long-toed Salamander - larvae

HABITAT shallow open water								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	h							
REPRODUCTION								

HABITAT slow perennial stream								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING					l	m		
REPRODUCTION								

Long-toed Salamander - larvae

HABITAT lake								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING					l	m		
REPRODUCTION								

Long-toed Salamander - adult

HABITAT shallow open water								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING								
REPRODUCTION	h							

HABITAT slow perennial stream								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING								
REPRODUCTION					l	m		

HABITAT lake								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING								
REPRODUCTION				l	m			

SOUTHERN INTERIOR ECOPROVINCE

Tiger Salamander

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
ponderosa pine	yearlong	scarce
Douglas-fir - ponderosa pine	yearlong	common
talus/rock	yearlong	common
shallow open water	yearlong	common
lake	yearlong	abundant

Tiger Salamander - larvae

HABITAT shallow open water								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING		m	m	m	m	m		
REPRODUCTION								

HABITAT lake								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING		h	h	h	h	h		
REPRODUCTION								

Tiger Salamander - neotenic adults

HABITAT shallow open water								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING		m	m	m	m	m		
REPRODUCTION		m	m	m	m	m		

HABITAT lake								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING		h	h	h	h	h		
REPRODUCTION		h	h	h	h	h		

Tiger Salamander - metamorphic adult

HABITAT Douglas-fir - ponderosa pine																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB/	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	m	m	m	l	m	l		m	l		l			l			l		
REPRODUCTION																			
HIBERNATION COVER	m	m	m	l	m	l		m	l		l			l			l		

HABITAT talus/rock																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB/	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	m	m																	
REPRODUCTION																			
HIBERNATION COVER	m	m																	

HABITAT shallow open water								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING								
REPRODUCTION		l	l	l	l	m		

HABITAT lake								
SEASON OF USE spring								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING								
REPRODUCTION		m	m	m	m	h		

SOUTHERN INTERIOR ECOPROVINCE

Roughskin Newt

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
shallow open water	yearlong	rare
lake	yearlong	rare
slow perennial stream	yearlong	rare

HABITAT shallow open water									
SEASON OF USE yearlong									
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	1							
REPRODUCTION	1							
ESCAPE COVER								

HABITAT slow perennial stream								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING					1	1		1
REPRODUCTION						1		
ESCAPE COVER								

HABITAT lake								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING					1	1		1
REPRODUCTION						1		
ESCAPE COVER								

SOUTHERN INTERIOR ECOPROVINCE

Western Toad

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
ponderosa pine	yearlong	scarce
Douglas-fir - ponderosa pine	yearlong	scarce
Douglas-fir - lodgepole pine	yearlong	common
Engelmann spruce - subalpine fir dry forested	yearlong	common
spruce riparian	yearlong	common
Engelmann spruce - subalpine fir dry parkland	yearlong	scarce
trembling aspen copse	yearlong	common
black cottonwood riparian	yearlong	common
big sage shrub/grassland	yearlong	scarce
talus/rock	yearlong	rare
bunchgrass grassland	yearlong	scarce
dry alpine	yearlong	scarce
alpine meadow/subalpine meadow	yearlong	scarce
shrub wetland	yearlong	common
sedge wetland	yearlong	common
shallow open water	summer	abundant
lake	summer	abundant
slow perennial stream	summer	common
orchard/vineyard	yearlong	scarce
pasture	yearlong	scarce
urban	yearlong	common

HABITAT sedge wetland																				
SEASON OF USE summer																				
LIFE REQUISITES	G F R O A R S B S/	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																		
REPRODUCTION	l																		

Western Toad

HABITAT shallow open water								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	m							
REPRODUCTION	m							

HABITAT slow perennial stream								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				m	l	m		
REPRODUCTION				m	l	m		

HABITAT lake								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	h		
REPRODUCTION				m	m	m		

Western Toad - adult

HABITAT Douglas-fir - lodgepole pine																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	l	l	l	m		l	l	m	l	m	m	l	m	m	l	m	m			
REPRODUCTION																				
HIBERNATION COVER	l	l	l	m		l	l	m	l	m	m	l	m	m	l	m	m	m		

Western Toad - adult

HABITAT Engelmann spruce - subalpine fir dry forested																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	l	l	l	m	l	l	m	l	m	m	l	m	m	l	m	m				
REPRODUCTION																				
HIBERNATION COVER	l	l	l	m	l	l	m	l	m	m	l	m	m	l	m	m	m			

HABITAT spruce riparian																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	m	m	m	h	m	m	h	m	h	h	m	h	h	m	h	h				
REPRODUCTION																				
HIBERNATION COVER	l	l	l	m	l	l	m	l	m	m	l	m	m	l	m	m	m			

HABITAT trembling aspen copse																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	l	l	l	m	l	l	m	l	m	m	l	m	m	l	m	m				
REPRODUCTION																				
HIBERNATION COVER	l	l	l	m	l	l	m	l	m	m	l	m	m	l	m	m				

Western Toad - adult

HABITAT black cottonwood riparian																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	m	m	m	h	m	m	h	m	h	h	m	h	h	m	h	h			
REPRODUCTION																			
HIBERNATION COVER	m	m	m	h	m	m	h	m	h	h	m	h	h	m	h	h			

HABITAT shrub wetland																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	m	m	m	m															
REPRODUCTION	l	l	l	l															

HABITAT sedge wetland																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																		
REPRODUCTION	l																		

Western Toad - adult

HABITAT shallow open water								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	m							
REPRODUCTION	m							

HABITAT slow perennial stream								
SEASON OF USE								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				m	l	m		
REPRODUCTION				m	m	m		

HABITAT lake								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	h		
REPRODUCTION				m	m	m		

HABITAT urban												
SEASON OF USE yearlong												
LIFE REQUISITES	C.FLD.	PAST.	ORCHARD				URBAN	BARR.	M.MELE.	CLIFF	CAVE
			YOUNG		MATURE						
			M	D	M	D					
FEEDING							l				
REPRODUCTION											
HIBERNATION COVER							l				

SOUTHERN INTERIOR ECOPROVINCE

Pacific Treefrog

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
ponderosa pine	yearlong	common
Douglas-fir - ponderosa pine	yearlong	common
Douglas-fir - lodgepole pine	yearlong	scarce
trembling aspen copse	yearlong	common
black cottonwood riparian	yearlong	common
marsh	summer	common
shallow [illegible] water	summer	common
lake	summer	common
slow perennial stream	summer	common

Pacific Treefrog - tadpole

HABITAT marsh																				
SEASON OF USE summer																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																			
REPRODUCTION																				

Pacific Treefrog - tadpole

HABITAT shallow open water								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	h							
REPRODUCTION								

HABITAT slow perennial stream								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	l	m		
REPRODUCTION								

HABITAT lake								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	h		
REPRODUCTION								

Pacific Treefrog - adult

HABITAT ponderosa pine																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB/	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING			1	1	1	1	1		1	1		1	1		1	1				
REPRODUCTION																				
HIBERNATION COVER			1	1	1	1	1		1	1		1	1		1	1		1		

HABITAT Douglas-fir - ponderosa pine																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB/	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING			m	m	m	m	m	m	m	m	m	m	m	m	m	m	m			
REPRODUCTION																				
HIBERNATION COVER			m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m		

HABITAT trembling aspen copse																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB/	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	1	1	m	m	m	m	m	m	m	m	m	m	m	m						
REPRODUCTION																				
HIBERNATION COVER	1	1	m	m	m	m	m	m	m	m	m	m	m	m				m		

Pacific Treefrog - adult

HABITAT black cottonwood riparian																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	1		h	h	h	h	h	h	h	h	h	h	h	h	h	h	h			
REPRODUCTION																				
HIBERNATION COVER	1		h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h		

HABITAT marsh																				
SEASON OF USE summer																				
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																			
REPRODUCTION	h																			

HABITAT shallow open water								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	h							
REPRODUCTION								

HABITAT slow perennial stream								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				1	1	m		
REPRODUCTION				1	1	m		

Pacific Treefrog - adult

HABITAT lake								
SEASON OF USE summer								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	h		
REPRODUCTION				l	m	h		

HABITAT urban											
SEASON OF USE yearlong											
LIFE REQUISITES	C.FLD.	PAST.	ORCHARD				URBAN	BARR.	M.MELE.	CLIFF	CAVE
			YOUNG		MATURE						
			M	D	M	D					
FEEDING							m				
REPRODUCTION											

SOUTHERN INTERIOR ECOPROVINCE

Great Basin Spadefoot Toad

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
ponderosa pine	yearlong	common
Douglas-fir - ponderosa pine	yearlong	common
big sage shrub/grassland	yearlong	common
shallow open water	summer	scarce
lake	summer	scarce
man-made elements	summer	common

HABITAT ponderosa pine

SEASON OF USE yearlong

LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h		h	m	l	m	m		h	h		h	h							
REPRODUCTION																				

HABITAT Douglas-fir - ponderosa pine

SEASON OF USE yearlong

LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	m		l	l		l	l		m	l		m	l		m	l				
REPRODUCTION																				

Great Basin Spadefoot Toad

HABITAT big sage shrub/grassland																			
SEASON OF USE yearlong																			
LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENT	
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN
FEEDING	h		h	m	l														
REPRODUCTION																			

HABITAT man-made elements												
SEASON OF USE summer												
LIFE REQUISITES	C. FLD.	PAST.	ORCHARD				URBAN	BARR.	M. M. ELE.	CLIFF	CAVE
			YOUNG		MATURE						
			M	D	M	D					
FEEDING												
REPRODUCTION									h		

SOUTHERN INTERIOR ECOPROVINCE

Northern Leopard Frog

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
marsh	yearlong	common
shallow open water	yearlong	scarce
lake	yearlong	scarce
slow perennial stream	yearlong	scarce

HABITAT marsh

SEASON OF USE yearlong

LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																			
REPRODUCTION	h																			

SOUTHERN INTERIOR ECOPROVINCE

Spotted Frog - larvae

HABITAT	SEASON OF USE	RELATIVE ABUNDANCE
black cottonwood riparian	yearlong	common
marsh	yearlong	abundant
shallow open water	yearlong	abundant
lake	yearlong	abundant
fast perennial stream	yearlong	common
slow perennial stream	yearlong	abundant

Spotted Frog - tadpole

HABITAT marsh

SEASON OF USE yearlong

LIFE REQUISITES	GRASS/	FORB	SHRUB/ SEEDLING			POLE-SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
			S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																			
REPRODUCTION																				

HABITAT shallow open water

SEASON OF USE yearlong

LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	h							
REPRODUCTION								
HIBERNATION COVER	m							

HABITAT lake

SEASON OF USE yearlong

LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	h	l	l
REPRODUCTION								
HIBERNATION COVER					h	h		

Spotted Frog - tadpole

HABITAT fast perennial stream									
SEASON OF USE yearlong									
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING					1	1		
REPRODUCTION								
HIBERNATION COVER					1	1		

HABITAT slow perennial stream								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				1	m	m		1
REPRODUCTION								
HIBERNATION COVER					m	m		

Spotted Frog - adult

HABITAT black cottonwood riparian																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
REPRODUCTION																			

HABITAT marsh																				
SEASON OF USE yearlong																				
LIFE REQUISITES	GRASS/ FORB	SHRUB/ SEEDLING			POLE- SAPLING			YOUNG			MATURE			OLD GROWTH			SPECIAL ELEMENTS		
		S	M	D	S	M	D	S	M	D	S	M	D	S	M	D	DM	SN	DEC
FEEDING	h																		
REPRODUCTION	h																		

Spotted Frog - tadpole

HABITAT shallow open water								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING	h							
REPRODUCTION	h							
HIBERNATION COVER	h							

HABITAT fast perennial stream								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING					l	l		
REPRODUCTION					l	l		
HIBERNATION COVER					l	l		

HABITAT lake								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	h	l	l
REPRODUCTION				l	m	h		
HIBERNATION COVER					h	h		

HABITAT slow perennial stream								
SEASON OF USE yearlong								
LIFE REQUISITES	POND	SHORE		LITTORAL			DEEP W.	
		R	U	R	U	A	R	U
FEEDING				l	m	m		l
REPRODUCTION					m	m		
HIBERNATION COVER					m	m		

3

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